

What is claimed is:

1. A surgical device for cutting material and monitoring ECG comprising:

5 an elongate member having a distal region and a proximal region;

an energy delivery device associated with the elongate member at the distal region for delivering cutting energy to the material, said energy delivery device adapted for connection to an energy source; and

10 an ECG monitoring device associated with the distal region for monitoring ECG, said ECG monitoring mechanism adapted for connection to an ECG recording device.

2. The device as claimed in claim 1 wherein the energy delivery device is configured to deliver at least one form 15 of cutting energy selected from a group consisting of: electrical energy; microwave energy; ultrasound energy; and laser energy.

3. The device as claimed in claim 1 wherein the energy delivery device is configured to deliver electrical energy 20 comprising electrical current having a frequency within the radio frequency range.

4. The device as claimed in claim 1 wherein the material comprises cellular tissue and wherein the energy delivery

device is operable to deliver sufficient energy to the tissue to result in a rapid increase in the intracellular temperature causing vaporization of intracellular water and subsequent cell lysis.

5 5. The device as claimed in claim 1 wherein the ECG monitoring mechanism comprises at least one active electrode about the distal region adapted for connection to an ECG recording device.

10 6. The device as claimed in claim 5 wherein the ECG monitoring mechanism operates in a unipolar mode.

7. The device as claimed in claim 5 wherein the distal region comprises two or more electrodes about the distal region adapted for connection to an ECG recording device; and wherein the electrodes are configured in an arrangement
15 where at least one of the electrodes is active and at least one is a reference electrode.

8. The device as claimed in claim 7 wherein the at least one active electrode is located distally to the at least one reference electrode about the distal region.

20 9. The device as claimed in claim 5 wherein the surgical device is insertable into a patient's vasculature using at least one of a guiding sheath and a dilator; and wherein at least one reference electrode is located on a distal region of at least one of the sheath and the dilator.

10. The device as claimed in claim 7 wherein the ECG monitoring mechanism operates in a bipolar mode.

11. The device as claimed in claim 1 wherein the energy delivery device comprises a functional tip with at least 5 one active electrode.

12. The device as claimed in claim 1 wherein the energy delivery device comprises a functional tip having two or more electrodes; and wherein the electrodes are configured in an arrangement where at least one of the electrodes is 10 active and at least one is a return electrode.

13. The device as claimed in claim 1 wherein the energy delivery device and the ECG monitoring device comprise one active electrode.

14. The device as claimed in claim 1 wherein a pressure 15 sensing mechanism is associated with the distal region for monitoring pressure about the distal region.

15. The device as claimed in claim 1 wherein the pressure sensing mechanism comprises a pressure transmitting lumen extending between the proximal and distal regions, said 20 lumen at the proximal region being adapted for fluid communication with a pressure transducer that provides a signal which varies as a function of pressure and adapted at the distal region for fluid communication with an environment about said distal region.

25 16. A method of surgery comprising the steps of:

(i) introducing a surgical device into a heart of a patient, the surgical device comprising an elongate member having a distal region and a proximal region, an energy delivery device proximate to the distal region capable of cutting material and an ECG monitoring mechanism for determining ECG in the heart proximate to the distal region;

(ii) positioning the energy delivery device to a first desired location in the heart adjacent material to be cut;

(iii) delivering energy using the energy delivery device to cut said material; and

(iv) monitoring ECG in the heart using the ECG monitoring mechanism in order to determine the position of the surgical device at least one of before and after step (iii).

17. The method as claimed in claim 16 further comprising a step of:

(v) advancing the device to a second location.

20 18. The method as claimed in claim 17 further comprising a
step of:

(vi) monitoring ECG using the ECG monitoring mechanism at the second location.

19. The method as claimed in claim 16 wherein step (i) comprises introducing the device into the patient's vasculature.

20. The method as claimed in claim 19 wherein the step of
5 introducing the device into the patient's vasculature comprises inserting the device into a dilator and a guiding sheath positioned in the patient's vasculature.

21. The method as claimed in claim 20 comprising a step of:

10 (v) advancing the dilator and the sheath to a second location together over the surgical device.

22. The method as claimed in claim 20 comprising a step of:

15 (v) advancing the dilator, sheath and surgical device all together into a second location.

23. The method as claimed in claim 16 wherein the material is tissue located on an atrial septum of the heart.

24. The method as claimed in claim 18 wherein the ECG monitored at the second location is the ECG in the left
20 atrium.

25. The method as claimed in claim 16 wherein step (ii) comprises dragging the surgical device about a surface of

the heart while simultaneously monitoring ECG to determine the first desired location.

26. The method as claimed in claim 25 wherein the first desired location is determined in response to the
5 observation of a distinctive change in the ECG signal.

27. The method as claimed in claim 26 wherein the ECG signal at the first desired location is damped in comparison with the ECG signal monitored otherwise on the surface of the heart as the surgical device is located
10 about the first desired location.

28. The method as claimed in ,claim 26 wherein the first desired location is a fossa ovalis of the heart.

29. An electrosurgical device comprising:

15 an elongate member having a distal region and a proximal region, said distal region insertable within and along a lumen within a body of a patient and maneuverable therethrough to a desired location where the device is operated to cut material and monitor ECG at the desired location;

20 at least one electrode associated with the distal region for cutting tissue, said at least one electrode adapted for coupling to an electrical power source; and

an ECG monitoring mechanism associated with the distal region for monitoring ECG at the desired location within the body, said mechanism adapted for coupling to an ECG recording device.

5 30. The device as claimed in claim 29 wherein the at least one electrode defines a functional tip comprising a conductive and radiopaque material at said distal region.

10 31. The device as claimed in claim 30 wherein the electrical power source is capable of providing a high-frequency electrical power to said functional tip in a high impedance range.

32. The device as claimed in claim 29 wherein the proximal region is adapted to releasably couple said electrode to said electrical power source.

15 33. The device as claimed in claim 29 wherein the proximal region is adapted to releasably couple said electrode to said ECG recording device.

34. A surgical device comprising:

20 means for cutting material at a desired location in a body of a patient; and

means for determining a position of the device responsive to ECG within the heart.

35. The device as claimed in claim 34 comprising a flexible elongate member having a proximal region and a distal region, said distal region adapted for insertion within and along a lumen within the body and maneuverable therethrough to the desired location; and wherein said means for determining a position of the device is associated with the distal region to determine the position of the distal region.

36. A method of cutting tissue at a desired location in a body of a patient comprising the steps of:

inserting a surgical device into the body, said surgical device comprising means for cutting material and means for determining a position of the device responsive to ECG within the heart; and

positioning said surgical device at the desired location in response to the means for determining a position of the device.

37. The method as claimed in claim 36 comprising the step of:

cutting material at the desired location.

38. The method as claimed in claim 37 comprising the step of:

moving said device in the body in response to said means for determining a position of the device.

39. The method as claimed in claim 38 comprising re-positioning said device for re-cutting in response to said means for determining a position of the device.